



Software Engineering Research Center (SERC)

Purdue University, University of Florida, and Oregon Associated Universities

International competition and the rapid growth of the computer software industry make it essential to develop new capabilities to produce software products

Center Mission and Rationale

American companies currently own 65 percent of the \$100 billion global computer software market. To remain competitive, the software industry needs to keep pace with the productivity gains achieved in hardware development, produce the quantity of software needed for new computer applications, and develop the highly reliable software that is required in critical application areas. Existing software technologies have been pushed beyond their limitations due to complex new application systems and the demand for software to support new applications. Moreover, software costs continue to rise, and the demand for new software products far exceeds programmer productivity gains.

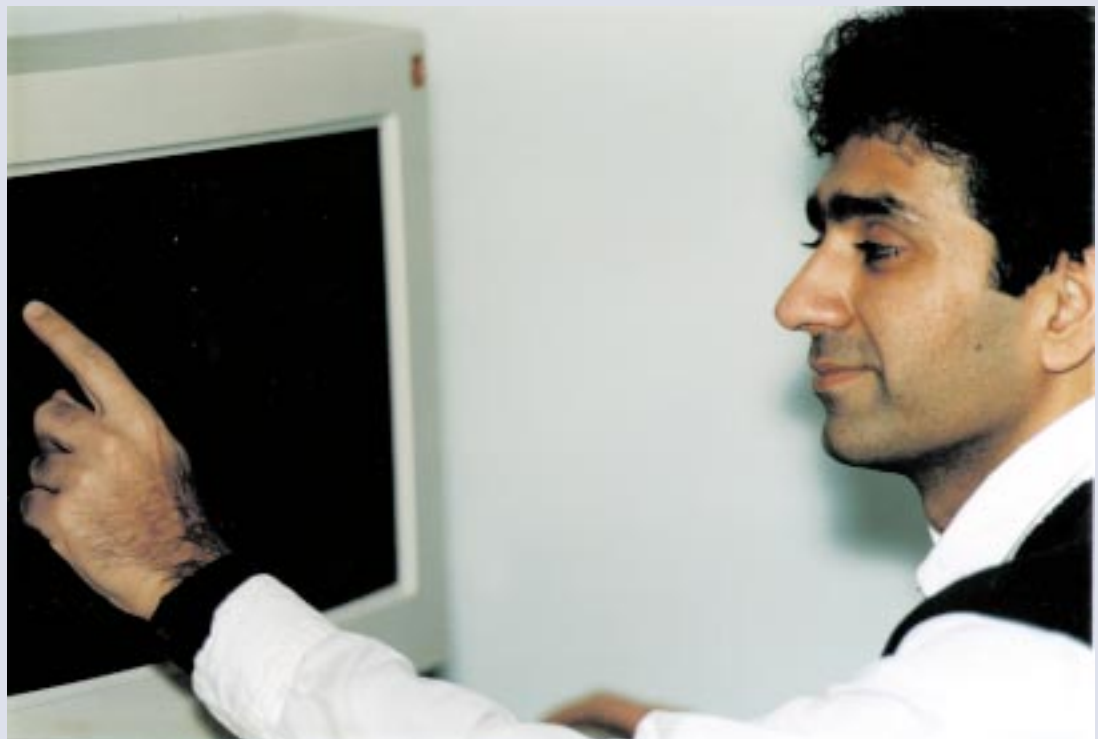
The research program of the Software Engineering Research Center (SERC) is focused on developing and assessing methods and tools to improve productivity and software quality throughout the software development life cycle. SERC performs basic and applied research designed to improve the management of the software engineering process, the productivity of software engineers, and the quality of software engineering products.

Research Program

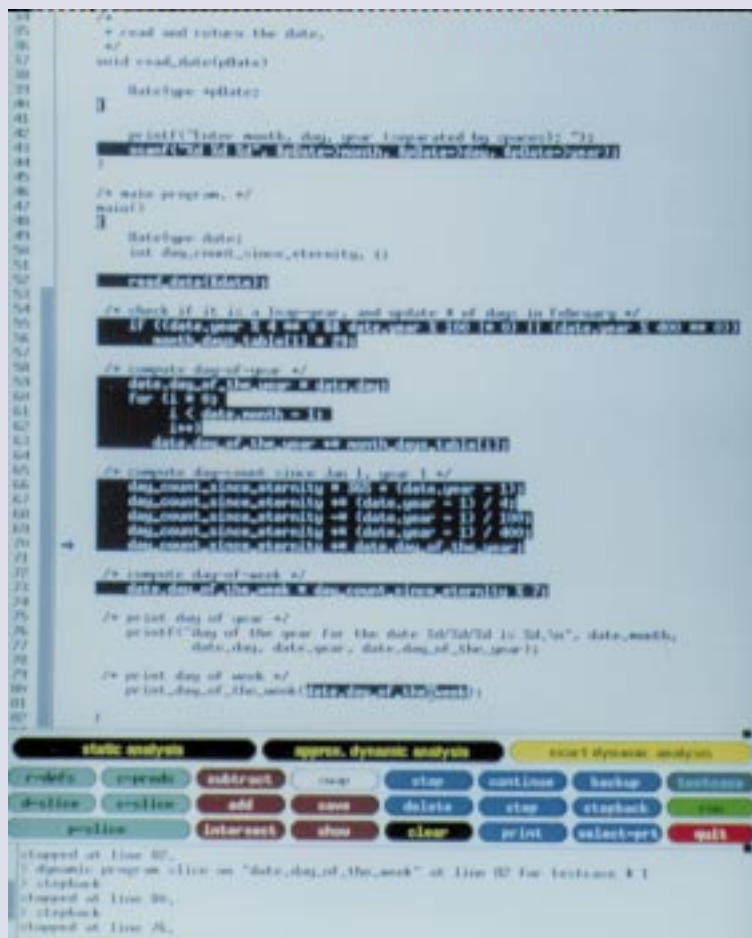
Software engineering — the technical design and production of software products — is a technology area that requires accelerated research and development. SERC's research thrusts are in the following areas —

- **Software development tools.** These tools are used in requirements engineering, scheduling for hard real-time systems, design engineering, user-interface generation, code analysis, software testing, debugging, and concurrency.
- **Software maintenance methods and tools.** These tools help programmers understand and enhance existing software. Topics addressed include maintaining object-oriented programs, dependency analysis, ripple-effect analysis, program slicing, and designing maintenance environments.
- **Software development in a distributed environment.** This research includes work on a multimedia, collaborative multi-user, software development application based on experimental distributed object technology and work on the InterBase system, an integrating framework and interface that permits heterogeneous (and potentially incompatible) software applications and databases to be used in an integrated fashion in a distributed environment.

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SERC researchers are investigating tool support needed for distributed multimedia collaborative software development.



Spyder, an advanced software debugging system developed by SERC.

SERC researchers collaborate with colleagues around the world and transfer information on international activities to SERC sponsors via SERC's Window-on-the-World program, which includes a postgraduate training and research consortium headquartered in Padua, Italy.

SERC participates in the Women, Minority, and Disabled Undergraduate Engineering Research Assistants program, as well as educational programs that provide support for minority institutions. Florida A&M University is collaborating with SERC on research in intelligent computer-integrated manufacturing systems with support from a Historically Black University Faculty Research Grant.

- **Software process modeling and metrics.** New techniques forecast the quality of software based on measurements recorded during the design stage. Also included in this area are the identification and measurement of factors that affect productivity, the development of software process modeling and analysis techniques for process improvement, and the development and validation of metrics and models for software cost and size estimation, reliability assessment, and testing.

Special Center Activities

The Center has been extremely successful in transferring SERC-produced technology to the industrial arena. Examples include —

- Fourteen software prototypes demonstrated or delivered to affiliates for internal use
- Possible commercialization of the *Design Metric Analyzer*, a software prototype built in collaboration with Magnavox Electronics Company
- A five-fold improvement in application developer productivity at BNR using SERC's InterBase system

- The COBOL Program Analysis Workbench, produced by Andersen Consulting, based on SERC's data model recovery tool
- The enhancement of ATAC, a Bellcore software product, by Purdue University personnel in collaboration with Bellcore researchers
- SERC transaction processing technology, implemented in a real-time database product by Harris Corporation
- Collaboration by SERC researchers with BNR to develop a feature-interaction analysis tool for use by BNR.

In addition to the principal research sites of the four campuses of the Oregon Associated Universities (University of Oregon, Oregon Graduate Institute, Portland State University, and Oregon State University), Purdue University, and the University of Florida, SERC has benefited from the involvement of researchers at the following universities: Ball State University, University of West Florida, Moorhead State University, University of Houston, University of North Florida, Florida A&M University, and the University of Minnesota.

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